

WHAT IS CLAIMED IS:

1. A digital signal processing device which determines one or more physiological parameters of a patient, the digital signal processing device comprising:
  - an input configured to accept first data corresponding to a first optical signal attenuated by tissue of a patient and to accept second data corresponding to a second optical signal attenuated by tissue of a patient;
  - a first generator configured to transform the first signal into a first modified signal which includes only non-zero values;
  - a second generator configured to transform the second signal into a second modified signal which includes only non-zero values;
  - a divider which determines ratios of the first modified signal to the second modified signal; and
  - a calculator which uses one or more calibration curves and the ratios to determine output values of one or more physiological parameters of the patient.
2. The digital signal processing device of Claim 1, wherein the device comprises a pulse oximeter.
3. The digital signal processing device of Claim 1, wherein the transform comprises a Hilbert Transform.
4. The digital signal processing device of Claim 1, wherein the first modified signal comprises a first complex signal.
5. The digital signal processing device of Claim 4, wherein the first complex signal comprises a complex photopleth.
6. The digital signal processing device of Claim 1, wherein the device provides point-by-point values for the physiological parameters of the patient.
7. The digital signal processing device of Claim 1, further comprising a phase filter configured to pass values of the ratios corresponding to a predetermined range of phases.

8. The digital signal processing device of Claim 1, further comprising:
  - a correlation generator configured to determine a correlation value between the first modified signal and the second modified signal; and
  - a correlation filter configured to pass values of the ratios corresponding to a predetermined set of correlation values.
9. The digital signal processing device of Claim 1, further comprising other engines configured to determine other output ratios through processing of the first signal and the second signal, wherein the digital signal processing device selects one of the ratios and other output ratios.
10. The digital signal processing device of Claim 1, further comprising other engines configured to determine other output values for the predetermined parameter through processing of the first signal and the second signal, wherein the digital signal processing device selects one of the output values and the other output values.
11. A method of determining a measure of a patient's blood oxygen saturation, the method comprising:
  - receiving data corresponding to a plurality of photoplethysmographs;
  - encoding each of the plurality of photoplethysmographs as a complex signal;
  - combining the plurality of complex signals into complex numbers; and
  - determining values of a measure a patient's blood oxygen saturation from the complex numbers.
12. The method of Claim 11, further comprising determining a measurement of confidence for each value of the complex numbers.
13. The method of Claim 12, further comprising filtering the complex numbers based on the measurement of confidence.
14. The method of Claim 12, wherein the measurement of confidence comprises a correlation value.
15. The method of Claim 12, wherein the measurement of confidence comprises a value of an associated phase.
16. The method of Claim 11, further comprising applying statistical analysis to the complex numbers.

17. A method of modifying a real signal representing an optical signal attenuated by tissue to determine a characteristic of the tissue through signal processing, the method comprising:

receiving in a pulse oximeter a real signal representing an optical signal attenuated by tissue; and

converting the real signal into the complex domain.